



**JFW INDUSTRIES, INC.**

**75SA-025  
OPERATING MANUAL**

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## **I. Technical Specifications of the 75SA-025**

### **A. Unit Functionality**

The JFW model 75SA-025 is a GPIB controlled 1P8T failsafe and self-terminating RF switch. The unit operates over a frequency range of DC to 1000 MHz and has a nominal impedance of 75 Ohms. The 75SA-025 is controlled via a SCPI compatible GPIB interface located on the back panel.

### **B. Mechanical Specifications**

The 75SA-025 is designed in a standard 19" rack enclosure assembly to remain compatible with most laboratory test racks. A mechanical outline drawing is included in **Appendix A**. This outline drawing details all necessary package dimensions and connector layouts. A copy of the outline drawing in PDF format is located on the CD that is included with this manual.

The front panel has five LEDs labeled Talk, Listen, SQR, Ready and Error that display the operations of the GPIB card. There are also eight LEDs located near the 1P8T switch knob that show the current setting of the switch.

The rear panel contains the AC power plug, RF connectors, fuse and GPIB bus connector. More details on the AC power input is available in the **AC Power Specifications** section.

### **C. RF Electrical Specifications**

The specification sheet can be found in Appendix B. The specification sheet details all RF specifications for the unit including VSWR, insertion loss, and isolation specifications. There is also a copy of the specification sheet in PDF format located on the CD.

## **D. AC Power Specifications**

The internal AC power supply is a universal power supply. The input AC voltage level can range from 85 to 264 VAC (47-63 Hz). Therefore it is applicable for both 110 VAC and 220 VAC input levels.

The 75SA-025 is also AC current protected by use of a 1 Amp "Slo-Blo" AC fuse also located on the rear panel. The fuse is field replaceable in the event of any failure to the fuse. To remove the fuse, use a small flat-blade screwdriver and pry out the fuse block. The fuse at the rear of the block is the one in use and there is a spare fuse included in the front section of the fuse block. The fuse itself is a 5x20 mm "Slo-Blo" type fuse and can be ordered through JFW or directly from Littelfuse. The JFW part number is 025-020. The Littelfuse part number is #215002.

## **II. Establishing Communication with the 75SA-025**

### **A. GPIB and the 75SA-025**

The GPIB card used inside the 75SA-025 is made by ICS Electronics and is model #4803. The GPIB bus interface meets the IEEE STD 488.1-1987 standard and has the following capabilities: SH1, AH1, T6, L4, SR1, PP0, DC1, RL0, DT1, C0, and E2 drivers.

Included with the 75SA-025 is a copy of the users manual for this particular card. This manual describes in detail the how to use this card. The 75SA-025 also comes with a program CD. The CD includes ICS's Windows Control Software called GPIBKYBD. Insert the CD into your CD-ROM drive on the controlling computer and run the SETUP.EXE to install this software. This software supports ICS's 488-PC2 Card, the National Instrument PC2a card (all versions) and most GPIB Controller Cards that use the NEC 7210 Controller Chip. This software allows the user to set the GPIB address of both the 75SA-025 and the controller card in the users PC. It gives the user a command prompt from which all the SCPI commands may be sent. This prompt is where all commands to set the switch positions will be sent. See the following section for command descriptions and examples.

Section 1.6.12 in the ICS manual lists timing data and diagrams for sending commands to the unit.

The unit is factory defaulted to SINGLE mode GPIB addressing with a bus address of 4. In SINGLE mode addressing, the unit can be changed to any bus address between 0 and 30.

The 75SA-025 setup configuration parameters are saved in nonvolatile Flash memory on the unit. These parameters are defaulted to the values listed in TABLE 1-2 of the ICS manual (page 1-12) but are modified by JFW before installation into the 75SA-025. The modified settings are shown in Appendix A, but should not be modified.

### **B. SCPI Command Strings**

There is a full list of SCPI Commands in Tables 3-2 and 3-3 in the ICS manual. The 75SA-025 conforms to IEEE STD 488.2-1987 standard and responds to the following required 488.2 commands:

**\*CLS, \*ESE, \*ESE?, \*ESR?, \*IDN?, \*OPC, \*OPC?, \*PSC, \*PSC?, \*RCL, \*RST, \*SAV, \*SRE, \*SRE?, \*STB, \*TRG, \*TST?, and \*WAI**

## **C. Commonly used Commands and JFW commands.**

### **1) \*IDN?**

Each unit also has a personalized IDN message preset before shipping the unit. The IDN message has the following format:

manufacturer, model #, serial number, revision information & ship date

The manufacturer is always defaulted as 'JFW Industries'. The model number can be either the JFW model or a customer specified part number. The serial number is assigned by JFW. The revision information consists of two parts. The first part is a numerical hardware revision (1.0, 2.0, etc.). The second part is a letter to indicate the 4803 firmware revision used (a, b, etc.). The last part of the IDN message is the date the unit was shipped. In the case of this 75SA-025, the IDN message should read:

JFW Industries, 75SA-025, s/n xxxxxx, Rev 1.0a xx.xx.xx

### **2) \*ESR?**

This command will return the contents of the Event Status Register. When this command is sent, it removes the contents of the ESR and returns it. This will clear any errors you have received. The Event Status Register is an eight-bit register, where each bit represents a condition that can be checked. Here is a chart of the representation of each bit in the ESR.

Bit 0 – Operation Complete	(1) LSB
Bit 1 – 4803 EDR #2	(2)
Bit 2 – Query Error	(4)
Bit 3 – Flash Data Corrupted	(8)
Bit 4 – Execution Error	(16)
Bit 5 – Command Error	(32)
Bit 6 – External Data Ready	(64)
Bit 7 – Power On	(128) MSB

These bits are combined together and sent to you as a single number. For example, if you are trying to set a switch on the 75SA-025 and you type SD1 1 instead of SS1 1, you will receive a red error light on the front panel of the unit. Typing the \*ESR? command will return a (32) to you. A (32) is bit five from the chart above and thus a command error. You have typed a command that is not a valid IEEE488.2 command or a valid JFW command. This command is also useful to tell if the unit is powered up. If you send a \*ESR? just after you have

turned on the power switch on the 75SA-025, the unit will return a (128), telling you that the unit has power and is functioning. Other seldom used uses of the \*ESR? command can be found in the ICS manual in section 3.

### 3) \*RST

This command resets the unit to its default startup configuration without modifying the GPIB address or ESR register. The 75SA-025 sets the switch to port 1 on startup. You can use this command to return to this state without cycling the power.

### 4) SS x

This command is the “set switch command”. The format is shown above, with “SS” being the command itself followed by a space and then the “x” being the switch port you wish to set. The acceptable states for the 1p6t switches are “0” through “7”. If the power to the 75sa-025 is turned off, the switch will be set to port “0” which is the failsafe port. Example commands can be found in the next section.

### 5) RS?

This command is the “read switch” command. It is used to query the state of any switch. This command must be followed by a “?”. This tells the GPIB controller that a response is requested. See the next section for code examples.

## **D. 75SA-025 - SCPI Code Examples**

### Example #1 – Set Switch to state 2.

Code: SS 2

### Example #2 – Set Switch to state 5.

Code: SS 5

### Example #3 – Read the state of Switch

Code: RS?

Returns → “0” through “7” depending on the current state of the switch

### Example #4 – Request the unit to identify itself.

Code: \*IDN?

Returns → “JFW Industries Inc., 75SA-025, s/n 123456, Rev 1.0a, 09-10-03”

## **E. Changing the GPIB Address**

The unit is factory defaulted to SINGLE mode GPIB addressing with a bus address of 04. In SINGLE mode addressing, the unit can be changed to any bus address between 0 and 30.

The following procedure may be used to change the GPIB address to whatever address is available in the user's system:

NOTE: The following procedure described is using the ICS Windows software GPIBKYBD. Depending on the software used will control how the user re-establishes communication with the board. The user should provide a minimum of 70 ms delay after an address change before the next command is sent.

```
SYST:COMM:GPIB:ADDR?           (to verify current programmed address)
SYST:COMM:GPIB:ADDR 12         (sets board to new address of 12)
Change the 'DEVICE ADDRESS' at the top of the screen to 712
SYST:COMM:GPIB:ADDR?           (to verify that address was changed to 12)
*SAV 0                          (to save changes)
```

If the current GPIB address is not known, you can query the unit as shown above (if communication is already established) or you can power the unit off and then back on. At power up, the LEDs on the 4803 controller board will blink the current GPIB address in a binary pattern. The binary pattern is:

TALK	8
LISTEN	4
SRQ	2
ERROR	1

You can view the LEDs on the front panel.

### **III. TROUBLESHOOTING PROBLEMS**

#### **A. Communication Errors - GPIB**

1. Before continuing, verify that the 75SA-025 is plugged in, the power switch light is on, and the GPIB cable is connected. Once a command is sent and the unit has received it, the Listen LED will light. If the command requested a response from the 75SA-025 and it has sent that response, the Talk LED should be on. If any combinations of LED's are flashing, see Table 5-1 of self-test error codes in the ICS manual.
2. The most common communication problem encountered is having the wrong GPIB address selected. The unit is set to address 4 in the factory prior to shipping. When trying to talk to the 75SA-025, you must be sending data to the same address. This is easily changed when using the GPIBKYBD program provided with the unit as detailed in the section of this manual Changing GPIB Address.
3. If the address is set to 4 and the unit is still not responding, then check to see if the commands being sent are in the proper format. Query the ESR register and verify there have been no command errors.

#### **B. AC Voltage Fuse**

There is a AC voltage fuse located on the back panel. The information for this fuse is located in the AC Power Specification section of this manual.

If this information did not solve your problems, please contact JFW by any of the methods listed below.

JFW Industries, Inc.  
Phone (317) 887-1340  
Fax (317) 881-6790  
Sales Email [sales@jfwindustries.com](mailto:sales@jfwindustries.com)  
Engineering Email [jfwengr@jfwindustries.com](mailto:jfwengr@jfwindustries.com)

# Appendix A

## Default Configuration Information

<u>Command</u>	<u>Function</u>	<u>Setting</u>
:ADDRESS	sets 75SA-025's GPIB bus address	4
:EXTernal	enables external address switch	OFF
:MODE	sets GPIB address mode	SINGLE
:INPut	sets number of Talk bytes	1
:POLarity	sets input polarity	1
:HANDshake	enables input handshaking	OFF
:TALK	selects input format	ASCIi
:TRANslation	sets input conversion table	use standard table
:OUTput	sets number of Listen bytes	4
:POLarity	sets output polarity	1
:LISTen	sets output format	ASCIi
:HANDshake	enables output handshaking	OFF
:EDR	sets EDR input active level	1
:INHibit	sets Inhibit output active level	1
:REMote	sets Remote output active level	1
:RESet	sets Reset pulse output active level	1
:STRobe	sets Data Strobe pulse active level	1
:TRIGger	sets Trigger Pulse active level	1
:ASTATus	sets Status A input active level	1
:BSTATus	sets Status B input active level	1
:LOCK	blocks items from changes	ON

# Appendix B